Minerals and Geology

Introduction

Mineral exploration activities have increased over the last five years. This activity includes one open pit non-ferrous mine currently proposed on the Forest, for which an environmental impact statement is being prepared. The Forest minerals and geology program has been in an adjustment period to improve administration of the minerals workload; insure laws, regulations, and policies are followed; ensure that minerals rights are respected; and to protect natural resources. This adjustment period also enables the Forest to work on existing projects while encouraging mineral exploration and development.

The federal government's policy for minerals resource management is expressed in the Mining and Minerals Policy Act of 1970. This act describes policy to: "foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs."

Within this context, the Forest has an essential role in contributing to an adequate and stable supply of mineral resources, while continuing to sustain the land's productivity for other uses and the capability to support biodiversity goals. The Forest has one gravel contract and two granite contracts permitted and active. Copper-nickel-platinum group metals deposits are being discovered and delineated in northern Minnesota. The SNF has a role in the future exploration and development of these resources and is committed to ensuring that activities are conducted in an environmentally sensitive manner and that planning and management of the activities integrate the principles of ecosystem management.

Two subsections are addressed in this section and include: Exploration and Permitting of Minerals, Sand, and Gravel and Exploration and Production of Minerals, Sand, and Gravel.

Mineral/Sand and Gravel Exploration and Development Permitting

When permitting minerals, sand, and gravel operation proposals, an environmental analysis is completed and the developed mitigation and operational guidelines are integrated into the permit/authorization.

Monitoring Question

> Are minerals, sand, and gravel exploration; and the development of permits following mineral-specific Forest Plan direction?

The question is driven by Forest Plan direction S-MN-12 and 13 which require that State and federal laws be followed, along with the establishment of mitigation measures and management to minimize and mitigate adverse environmental effects (Forest Plan p. 2-10).

Forest Plan minerals standards and guidelines apply to federal and non-federal minerals inside and outside the BWCAW and Mining Protection Area. Some of the standards and guidelines address permitting.

There are two monitoring units of *measure* for the development permitting of minerals, sand, and gravel exploration. The first one is the number of federal mineral permits issued to standard, while the second one is the number of private mineral projects administered to standard. Both measures include administration a national Forest Service standard that permit in accordance with forest plan direction.

The unit of comparison is the number of permits issued in accordance with Forest Plan standards and guidelines.

These units of measure and comparison were chosen because mineral permitting describes requirements and best management practices that must be followed for the protection of sensitive resources. It also allows for multiple uses of the Forest that include mineral exploration and mining.

Monitoring Method(s)

During the permitting and NEPA environmental analysis, specialists refer to the Forest Plan for guidance. In addition, best management practices are included in the large mineral material contracts. These include: reclamation, topsoil salvage, road/access closures, site maintenance for erosion control, and noxious weeds and administrative reporting. The monitoring of permitting is completed concurrently during this phase. The contracts are then reviewed by the districts before granting approval.

Results

There were three new private hardrock mineral exploration projects processed and 124 new sand and gravel permits issued that included best management practices and Forest guidelines. Only monitoring of the permitting phase and not the implementation phase is addressed in the next section.

Implications

During permitting, no Forest Plan changes were recommended by FS personnel. This indicates that no change is necessary for the permitting process at this time.

Exploration and Production of Minerals, Sand, and Gravel

Mineral permit operators implement agency approved operating plans, contracts, or in the case of private minerals, concurrence letters. In addition, the Forest Service utilizes sand and gravel materials from quarries scattered across the Forest. All quarry activities should follow pit management plans. Monitoring is performed to ensure activities follow the correlating authorizations or plans and those local resources are protected. The goal is to facilitate mineral exploration and development on the Superior National Forest while

incorporating best management practices (BMPs) and mitigation measures in permits that protect, sustain, and restore forest resources. Documentation of monitoring and mitigation effectiveness assists the Forest in developing future project permit requirements to meet forest goals. Monitoring is important to the administration of projects and to the evaluation of activities, regarding the degree of potential impacts to resources.

Monitoring Question(s)

Are minerals, sand, and gravel exploration, development, and production operations in compliance with the permits/contracts/concurrence letters?
Are the required/recommended mitigation measures and best management practices effective for these resources?

The Forest Plan has limited minerals and geology direction and correlating standards and guidelines. Two that directly relate to these types of activities are: mitigation to protect surface resources (S-MN-12 and 13, Forest Plan p. 2-10) and reclamation (G-MN-1, Forest Plan p. 2-10).

There are six units of measure for this monitoring. They include: operating plan compliance, road closure effectiveness, reclamation effectiveness, drilling fluid sump effectiveness at protecting water quality, road rutting, and volume or weight of rock.

There are six units of comparison for this monitoring. They include: the presence of an operating plan including mitigation and BMPs, temporary road effectiveness at restricting vehicles and motorized use by the public, reclamation effectiveness at stabilizing the soils and restoring the site to similar pre-project conditions, drill sumps that function as designed to contain fluids and cuttings, road rut size and depth compared to Forest standards, and quarterly quarry excavation surveys compared to previous quarry dimensions- assuring that the proper amount is collected from the permittee.

There are five reasons for selecting these units of measure and comparison:

1. Permittees must follow an operating plan/contract/concurrence letter during their activities. These authorizations incorporate mitigation measures to protect surface resources. The activities are monitored, and if there are compliance issues, the Bureau of Land Management (BLM) is notified, as the authorized agency, to remedy the situation. For minor issues, the Forest Service works with the company to resolve it quickly without BLM assistance.
2. Road closure is a requirement in an operating plan/contract/concurrence letter and is monitored for completion and effectiveness. Effectiveness is important since resources such as wildlife, soils, and hydrology can be affected by road use activities. Lynx in particular is sensitive to increases in road use.
3. The permittee is not allowed to rut roads. This is intended to protect soils, water quality, and vegetation. Reclamation is another requirement in an operating plan/contract/concurrence letter and is monitored for completion and effectiveness. It is important for soil stabilization, regrowth of vegetation, and wildlife.

4. Drilling fluid sumps constructed during hardrock drilling and portable tanks are designed to collect and contain the drilling fluids along with allowing water to be recycled and reused for drilling. It is important to contain the fluids so they do not affect vegetation, soil productivity, or water quality. The containment of the drilling particles in a sump allows them to be buried below the surface and reclaimed. Tanks are used in wetlands so particles and fluids are removed from the site and disposed at a stable site away from water.
5. Mineral material contracts sell material for a price that is based on an appraised value. The payment submitted by the company is supported by their reported excavation and removal volumes.

Monitoring Method(s)

Mineral operations are administered and inspected on the ground to ensure companies are performing their activities in accordance with Forest Service and BLM requirements. A monitoring form is used to document observations. An example of a completed form is located in the M&E Project file. If mitigation measures and BMPs need modifications or other unanticipated impacts are occurring, modifications are made to the permit. Lessons learned from monitoring are applied to future permitting. In addition, mineral material (sand, gravel, and granite) contracts must be monitored to ensure the production volumes reported by the companies are accurate and the correct amount of payment is collected.

Results

Hardrock mineral projects were monitored in the field for approximately 12 days. Ten different projects were monitored during that time. Nine projects were in compliance and one did not have an access road properly closed for interim reclamation. The closure used a berm and tank trap design that is no longer allowed by the Forest Service. A letter was sent to the company and the problem was resolved. A more detailed discussion of monitoring results can be found in the minerals inspection reports.

Three hardrock exploration projects were permitted. All were on private minerals. There were 129 drill holes permitted; however, only six were drilled. There were seven holes drilled on past permits, totaling 13 holes drilled in 2009. All mitigation measures and requirements were met.

Noise from this minerals activity was an issue that was brought up by some of the general public during permitting in 2007 and 2008. During site visits, drilling noise did not appear to be excessive and was assumed not to exceed State standards. Mitigation measures were included during project approval, such as sound baffles surrounding the drill rigs and vertical exhaust extensions. One attempt was made to digitally monitor core drilling sound. The attempt was unsuccessful due to environmental conditions (high wind). Future sound monitoring will be attempted during 2010. Visual monitoring verified that sound baffles and exhaust extensions were incorporated into operations.

Of the 13 holes drilled in FY 2009, 11 had associated sumps. The other two holes had tanks. All sumps appeared to function as designed with no escape or overflow of drilling fluids, and drill cuttings were contained.

There were 0.83 miles of new temporary access roads constructed and 0.84 miles of reconstruction/clearing. Approximately 0.43 miles of temporary roads were temporarily and permanently reclaimed. Six road closures were constructed. These and two other existing closures were monitored. All eight appeared effective with no evidence of unauthorized access across or through closed roads. Approximately 1.46 miles of temporary roads were monitored. No rutting or other issues were reported.

Eight drill holes were permanently abandoned and five were temporarily abandoned. Eight drill pads were permanently reclaimed and five had interim reclamation completed. Approximately 0.46 acres were permanently reclaimed and 0.29 acres had interim reclamation completed. These and other reclaimed sites appeared stable with no soil erosion issues and vegetation was reestablishing well on the older reclaimed sites. All sumps that were constructed were backfilled after drilling and the drill pad sites were contoured to match the existing terrain. Topsoil was replaced on the sites and woody debris was spread over the sites and access roads.

Mineral material quarries were monitored in the field for fifteen days at fifteen quarries. Two settling ponds were visually monitored at two granite dimension stone quarries. They appeared to be effective in treating/settling out of fine particles before the water left the pond. Volume verification surveys were completed eight times during the year. There were no issues associated with operator volume reporting. Table 10-1 shows the number of permits (free use, contract/permits, and Forest administrative use), tons quarried, and value of the sand and gravel removed during 2009.

Table 10.1. Sand/gravel permits issued during 2009 on the SNF

Type	Number	Tons	Value $
Contracts	101	213,265	225,068
Free Use Permits	33	39,387	35,692
In-Service (Admin)	9	6,896	4,789
Total	143	259,548	265,549

In summary, monitoring determined that mitigation and best management practice requirements were followed. Specific examples include:

- Noise baffles and muffler extensions were used to reduce the sound from drilling.
- Access roads were not rutted (due to frozen ground conditions, dry ground conditions, or gravel being placed on roads providing increased bearing capacity).
- Roads were effectively closed (with one exception where the operator corrected a closure after they were contacted about the problem), and no unauthorized motorized vehicle use was recorded.
- Drill fluid sumps operated as designed. Fluids and drill cuttings were contained and were reclaimed after drilling was completed. Drill holes were either permanently or temporarily abandoned in accordance with State requirements. Areas not needed for future operations were permanently reclaimed and mineral material quantities removed under large contracts were surveyed and verified as correct.

Figure 10.1. An example of an effective road closure and reclamation with boulders and woody debris on the Superior National Forest.

Figure 10.2. Noise baffles surrounding a drill rig on the Superior National Forest.

Figure 10.3. An example of a sump to contain and re-circulate drilling fluids on the Superior National Forest.

Implications

Monitoring verified that mineral exploration projects were permitted with appropriate mitigation and best management practices to protect Forest resources. Although some impacts were identified such as noise from drilling and some minor soil/road rutting, these impacts did not exceed the requirements from the permits. This verifies that mineral exploration on the Forest is a multiple-use activity that is compatible with other uses. Permit operators follow operating plans, but when unplanned or unanticipated issues develop, they cooperate with the Forest to resolve them.

Recommendations

1. During past environmental analyses for hardrock drilling projects, concern was raised from the public about drill sump effectiveness and whether they impact water quality. A small monitoring study should be developed to verify the NEPA assumptions that water quality is not impacted.

2. Many mineral material quarries on the Forest are not monitored due to lack of personnel. In the future, the monitoring crew should be used to assist with quarry monitoring, and as time allows, other hardrock monitoring for road closure effectiveness and reclamation.

3. The Forest Plan addresses mineral and geology management minimally. In the next Forest Plan revision, more in depth analysis should be included for this resource and more standards and guidelines should be provided.